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EXAMINER	
BOUTSIKARIS, LEONIDAS	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 03/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/782,341	MASTERSON, HUGH J.	
	Examiner	Art Unit	
	Leo Boutsikaris	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17,19,21,26-33,35-39 and 42-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17,19,21,26-33,35-39 and 42-47* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 19, 42 are objected to because of the following informalities: said claims recite in lines 5 and 3, respectively, "spectrally complementary beams", which lacks antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 19 and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 19 and 42 recite that "the plurality of spectrally complementary beams have[ing] a first polarization" and that a beam having a second polarization is separated into a second plurality of spectrally complementary beams. It is not clear whether the beam having the second polarization is one of the plurality of beams having complementary polarizations resulting from separating the incident beam or some other beam. The language of said claims is very confusing, and it is strongly suggested that Applicant rewrites the claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 8, 15, 21-22, 24, 26-29, 33, 35-39, 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marshall (US 6,406,148) in view of Mitsutake (EP 0520369).

Regarding claims 1, 21-22, 24, 26-29, 35-39, 43-47, Marshall discloses an electronic color switching system for selectively filtering incident light comprising:

a first interference-filter array comprising dichroic filters 204, 210, 216 arranged to separate the incident beam into a plurality of spectrally complementary beams 206, 212, 218;

an array of configurable optical shutters 320 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array 222 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light 224 (Fig. 3, lines 7-49, col. 6).

However, Marshall does not specify that the optical shutters are positioned between an input polarizer and an output polarizer, said two polarizers having a relative orientation of substantially 90 degrees. Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). The input polarizer 45 and the output polarizer 49 are oriented ninety degrees apart (see

Fig. 1B and compare arrows 45 and 49 therein). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the optical shutters in Marshall's system between respective polarizers and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the shutters, as it is known in the art.

Regarding claim 8, the second interference filter array comprises a first band-edge interference filter 222 from which the output beam 224 emanates and a mirror (adjacent to said filter 222 and not assigned a number in Fig. 3).

Regarding claims 15, 21, 33, the shutters can be liquid crystal shutters (lines 57-59, col. 4).

Claims 1-6, 8-12, 21-24, 26-31, 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ledebuhr (US 4,786,146) in view of Mitsutake (EP 0520369).

Regarding claim 1, 21-24, 26-29, 43-47, Ledebuhr discloses an electronic color illumination system for selectively filtering incident light comprising:

a first interference-filter array comprising dichroic filters 14, 16, 18, arranged to separate the incident beam into a plurality of spectrally complementary beams;

an array of configurable optical shutters 20, 22, 24 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array 40, 42, 44, arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light (Fig. 1, line 39, col. 2 to line 59, col. 3).

However, Ledebuhr does not specify that the optical shutters are positioned between an input polarizer and an output polarizer, said two polarizers having a relative orientation of substantially 90 degrees. As described above, Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). The input polarizer 45 and the output polarizer 49 are oriented ninety degrees apart (see Fig. 1B and compare arrows 45 and 49 therein). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the optical shutters in Ledebuhr's system between respective polarizers and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the shutters, as it is known in the art.

Regarding claim 2, the first interference-filter array comprises a first band-edge filter 14 disposed to encounter the incident beam and a mirror 18 disposed to encounter one of the plurality of spectrally complementary beam, since Ledebuhr teaches that the filter 18 may be replaced by a mirror (lines 65-67, col. 3).

Regarding claim 8, the second interference-filter array comprises a first band-edge interference filter 44 from which the output beam emanates and a mirror 40, since Ledebuhr teaches that the filter 40 may be replaced by a mirror (lines 38-40, col. 3).

Regarding claim 3, Ledebuhr discloses all the limitations of said claim except for teaching that a plurality, i.e., more than one filter is disposed between the first filter 14 receiving the incident light and the mirror 18. Fig. 1 shows one filter, 16, disposed between filter 14 and mirror 18. It would have been obvious to one of ordinary skill in the art at the time the invention

was made to include several filters between the first filter and the mirror in the system of Fig. 1, since it has been held that discovering an optimum value of a result effective variable includes only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Here, the result effective variable is the number and extent of the non-overlapping, complementary spectral regions that the incident spectrum is split by the array of the filters. The greater the number of the complementary spectral regions is, a greater flexibility in controlling the hue of the (recombined) output light exists, by appropriately operating the optical shutters disposed between the first and the second array of optical filters.

Regarding claim 4, all the filters and the mirrors are inclined 45 degrees relative to the optical path.

Regarding claims 5-6, the filters are such that one allows only the high wavelengths, e.g., blue, to pass through, whereas the rest allow the lower wavelengths to pass through.

Regarding claim 9, Ledebuhr in view of Mitsutake discloses all the limitations of said claim except for teaching that a plurality, i.e., more than one filter is disposed between the last filter 44 emitting the output light and the mirror 40. Fig. 1 shows one filter, 42, disposed between filter 44 and mirror 40. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include several filters between the last filter and the mirror in the system of Fig. 1, since it has been held that discovering an optimum value of a result effective variable includes only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Here, the result effective variable is the number and extent of the non-overlapping, complementary spectral regions that the incident spectrum is split by the array of the filters. The greater the number of the complementary spectral regions is, a greater flexibility in controlling

the hue of the (recombined) output light exists, by appropriately operating the optical shutters disposed between the first and the second array of optical filters.

Regarding claim 10, all the filters and the mirrors are inclined 45 degrees relative to the optical path.

Regarding claims 11-12, the filters are such that one allows only the high wavelengths, e.g., blue, to pass through, whereas the rest allow the lower wavelengths to pass through.

Regarding claims 30-31, Ledebuhr in view of Mitsutake discloses all the limitations of said claims except for specifying the type of the interference filter used in the optical system, i.e., Raman edge filter or Rugate notch filter. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use said types of filters, since Official Notice is taken that these filters are widely used in the field of optics.

Claims 21-22, 24, 26, 33, 35-39, 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Konno (US 5,327,229) in view of Mitsutake (EP 0520369).

Konno discloses a color display device comprising a first array of color filters 2-4, a second array of color filters 8-10, wherein an array of optical shutters 5-7 is disposed between respective pairs of optical filters (Fig. 1). The first array of filters separates the incident polarized light into spectrally complementary beams and the second array of filters recombines the separated beams into an output beam (lines 15-51, col. 1).

However, Konno does not specify that the optical shutters are positioned between an input polarizer and an output polarizer, said two polarizers having a relative orientation of

substantially 90 degrees. As described above, Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). The input polarizer 45 and the output polarizer 49 are oriented ninety degrees apart (see Fig. 1B and compare arrows 45 and 49 therein). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the optical shutters in Konno's system between respective polarizers and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the shutters, as it is known in the art.

Claims 1-2, 7-8, 14, 16-17, 21-22, 24, 26-29, 32, 35-39, 43-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over LaDuke (US 5,262,895) in view of Mitsutake (EP 0520369).

Regarding claims 1, 16-17, 21-22, 24, 26-29, 35-39, 43-47, LaDuke discloses an electronic color synthesizer system for selectively filtering incident light comprising:

a first interference-filter array comprising filters 26a, 28 arranged to separate the incident beam into a plurality of spectrally complementary beams 16a, 16i, 16c;

an array of configurable optical shutters 32, 38, 44 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array comprising filters 26b, 30 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light 16k (line 66, col. 4 to line 53, col. 5).

However, LaDuke teaches that only filter 30 is an interference-type filter, e.g., a dichroic. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make all the filters in LaDuke's system dichroic filters, since Official Notice is taken that dichroic, multi-layer filters which selectively pass certain wavelength ranges of light, and whose operation is based on interference effects, are widely used in the field of projection optics. Interference filters can be designed with great flexibility to provide a desired transmission spectrum and can easily be manufactured via well established thin film coating techniques.

Furthermore, LaDuke does not specify that the optical shutters are positioned between an input polarizer and an output polarizer, said two polarizers having a relative orientation of substantially 90 degrees. As described above, Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). The input polarizer 45 and the output polarizer 49 are oriented ninety degrees apart (see Fig. 1B and compare arrows 45 and 49 therein). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the optical shutters in LaDukes's system between respective polarizers and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the shutters, as it is known in the art.

Regarding claim 2, the first interference-filter array comprises a first band-edge filter 26 disposed to encounter the incident beam 16 and a mirror 24 disposed to encounter one of the plurality of spectrally complementary beam, i.e., 16c.

Regarding claim 7, LaDuke discloses all the limitations of said claim, including a band-edge filter 26 and a second mirror 24 disposed to encounter one of the plurality of spectrally complementary beams. However, LaDuke does not show a first mirror that reflects the incident beam and sends it to edge filter 26. It would have been obvious to one of ordinary skill in the art at the time the invention was made to direct the input light to the filter via a first mirror, since Official Notice is taken that the use of mirrors for beam folding an input beam in an optical system is widely known, for achieving, *inter alia*, a more compact system.

Regarding claim 8, the second interference-filter array comprises a first band-edge interference filter 30 from which the output beam 16k emanates and a mirror 18.

Regarding claims 14, 32, the shutters can be mechanical shutters such as iris diaphragms or sliding blade apertures (lines 61-63, col. 3).

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over LaDuke (US 5,262,895) in view of Mitsutake (EP 0520369) and further in view of Marshall (US 6,406,148).

LaDuke in view of Mitsutake discloses all the limitations of said claim, including a second mirror 18 disposed to encounter one of the plurality of spectrally complementary beams, i.e., 16a, and a band-edge filter 30 disposed to transmit the output beam 16k. However, LaDuke does not show a first mirror from which the output beam emanates and which receives the output light from said filter. As described *supra*, in Marshall's system, an output mirror is used to receive the output light from the last filter 222 and (re)direct it towards the SLM 226. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an output mirror in LaDuke's system for beam-folding purposes.

Claims 1, 19, 21-24, 26-29, 35-39, 42-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ho (US 6,398,363) in view of Mitsutake (EP 0520369).

Regarding claims 1, 21-24, 26-29, 35-39, 43-47, Ho discloses an electronic color projection system for selectively filtering incident light comprising:

a first interference-filter array comprising filters 60, 62, 64 arranged to separate the incident beam into a plurality of spectrally complementary beams Sr, Sg, Sb;

an array of configurable optical shutters 52, 54, 56 disposed along paths of the separated beams to selectively block transmission of the respective separated beams, and;

a second interference-filter array comprising filters 61, 63, 65 arranged to combine the separated beams whose transmission has not been blocked based on the operational status of the shutters to produce a filtered output beam of light Srgb (Fig. 4).

However, Ho does not specify that the filters are interference-type filters. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make all the filters in Ho's system interference filters, since Official Notice is taken that interference, multi-layer filters which selectively pass certain wavelength ranges of light, and whose operation is based on interference effects, are widely used in the field of projection optics. Interference filters can be designed with great flexibility to provide a desired transmission spectrum and can easily be manufactured via well established thin film coating techniques.

Furthermore, Ho does not specify that the optical shutters are positioned between an input polarizer and an output polarizer, said two polarizers having a relative orientation of substantially 90 degrees. As described above, Mitsutake discloses an optical projector, wherein input light is split into complementary spectral regions, and the various light components are modulated by a

plurality of light valves, each of which is disposed between a pair of complementary polarizers (see Figs. 5 and 8). The input polarizer 45 and the output polarizer 49 are oriented ninety degrees apart (see Fig. 1B and compare arrows 45 and 49 therein). It would have been obvious to one of ordinary skill in the art at the time the invention was made to position the optical shutters in Ho's system between respective polarizers and analyzers, as taught by Mitsutake, for achieving better extinction ratio for the light being passed or blocked by the shutters, as it is known in the art.

Regarding claims 19, 42, in Ho's system, the various filters separate the incident beams into output beams having complementary polarization states, i.e., s and p, hence some of the filters may be considered as operating on beams of one polarization and the rest operating on beams of the second polarization (each set of filters having a corresponding set of optical shutters).

Response to Applicant's Arguments

Applicant's arguments filed on 12/12/2005 have been fully considered but they are not persuasive.

Regarding Applicant's argument that Mitsutake does not show an optical shutter disposed between a polarizer and an analyzer that are oriented 90 degrees apart, the examiner respectfully disagrees and notes that Fig. 1B of Mitsutake clearly shows that the input and output polarizers have axes 45 and 49 that are 90 degrees relative to each other.

Regarding Applicant's argument that Ho does not show the extra sets of interference arrays for the complimentary polarizations, it is submitted that the claim language is broad enough to read on Ho's system if one considers some filters acting on one polarization and some

others acting on the second polarization. This was based on examiner's best understanding of claims 19 and 42, the language of which is problematic, as described above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Leo Boutsikaris whose telephone number is 571-272-2308.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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March 2, 2006

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